

INTERNATIONAL INTERGOVERNMENTAL ORGANIZATION
МЕЖДУНАРОДНАЯ МЕЖПРАВИТЕЛЬСТВЕННАЯ ОРГАНИЗАЦИЯ
JOINT INSTITUTE FOR NUCLEAR RESEARCH
ОБЪЕДИНЕННЫЙ ИНСТИТУТ ЯДЕРНЫХ ИССЛЕДОВАНИЙ



www.jinr.ru

THE JOINT INSTITUTE FOR NUCLEAR RESEARCH

Short introduction

D. Kamanin, JINR

60 years: Mission of JINR

Science
Bringing
Nations
Together



5 Major Pillars:

□ Research

Basic studies at the frontiers of knowledge

□ International cooperation

Combining world intellect and material resources

□ Innovation

Multi-disciplinary studies

New instruments and technologies

□ Education

Training students, young scientists and engineers

□ Outreach

Promoting science in society worldwide

Basic
Research

International cooperation

Innovations

Education

Outreach

Establishment of the Joint Institute for Nuclear Research

The Joint Institute for Nuclear Research (JINR) is an international intergovernmental scientific research organization established through the Convention signed on 26 March 1956 in Moscow to unite scientific and material potential of its member states in order to study fundamental properties of matter



Albania



Bulgaria



China



Czechoslovakia



GDR



Hungary



D.P.R.Korea



Mongolia



Poland



Romania



USSR

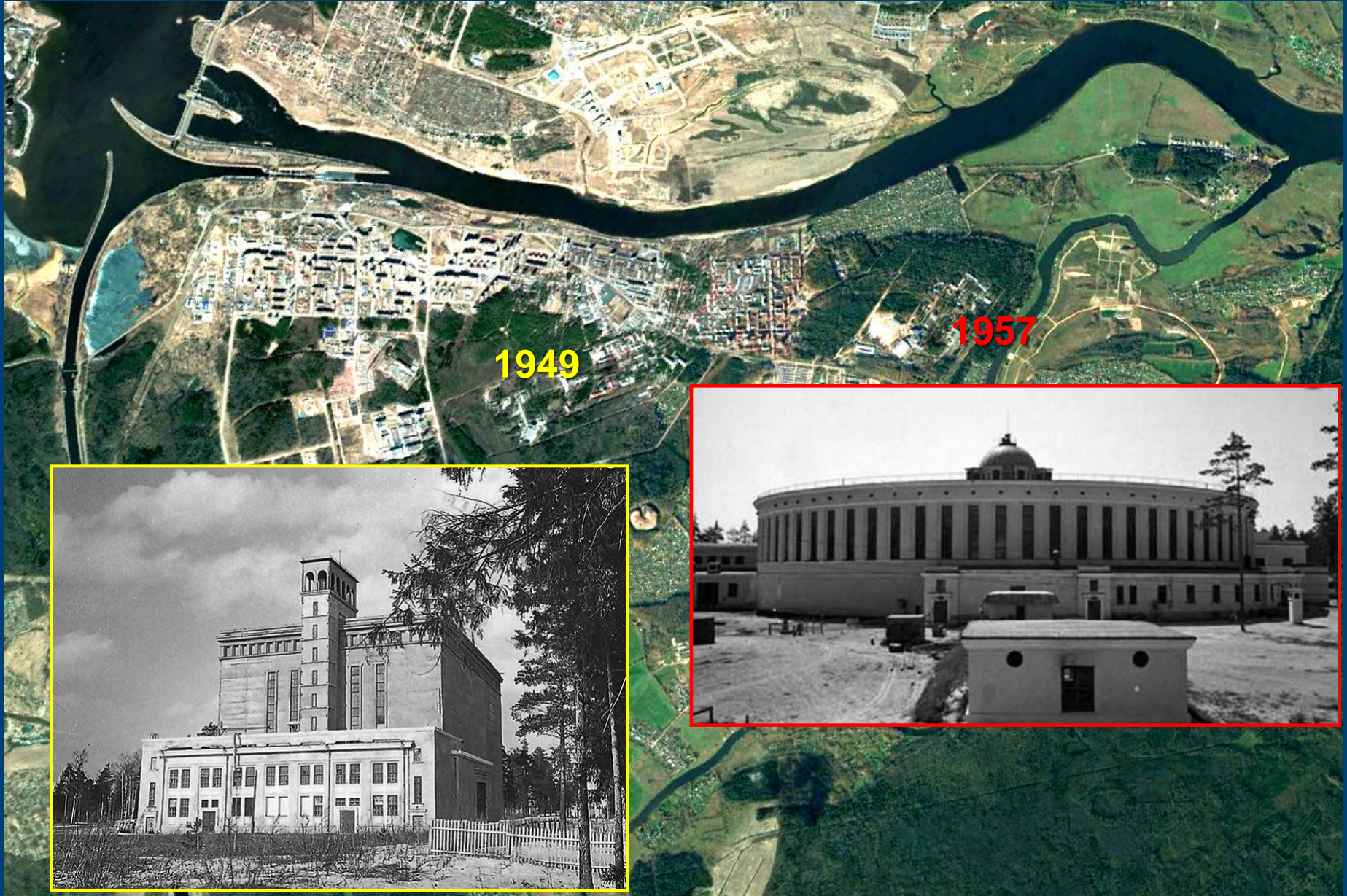


Vietnam



The results of research carried out at the Institute can be used solely for peaceful purposes for the benefit of mankind.

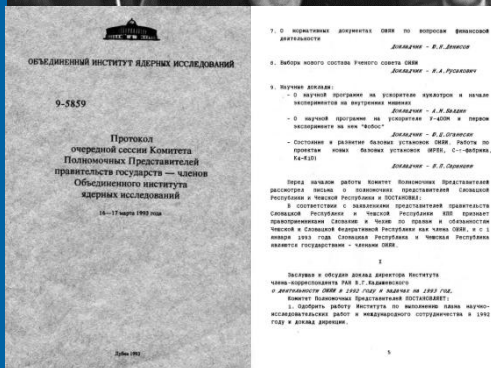
Dubna – Island of Stability



1993–2018: 25 years of the New Era of the Joint Institute for Nuclear Research



Session of the JINR Committee of Plenipotentiaries, Dubna, 17 March 1993

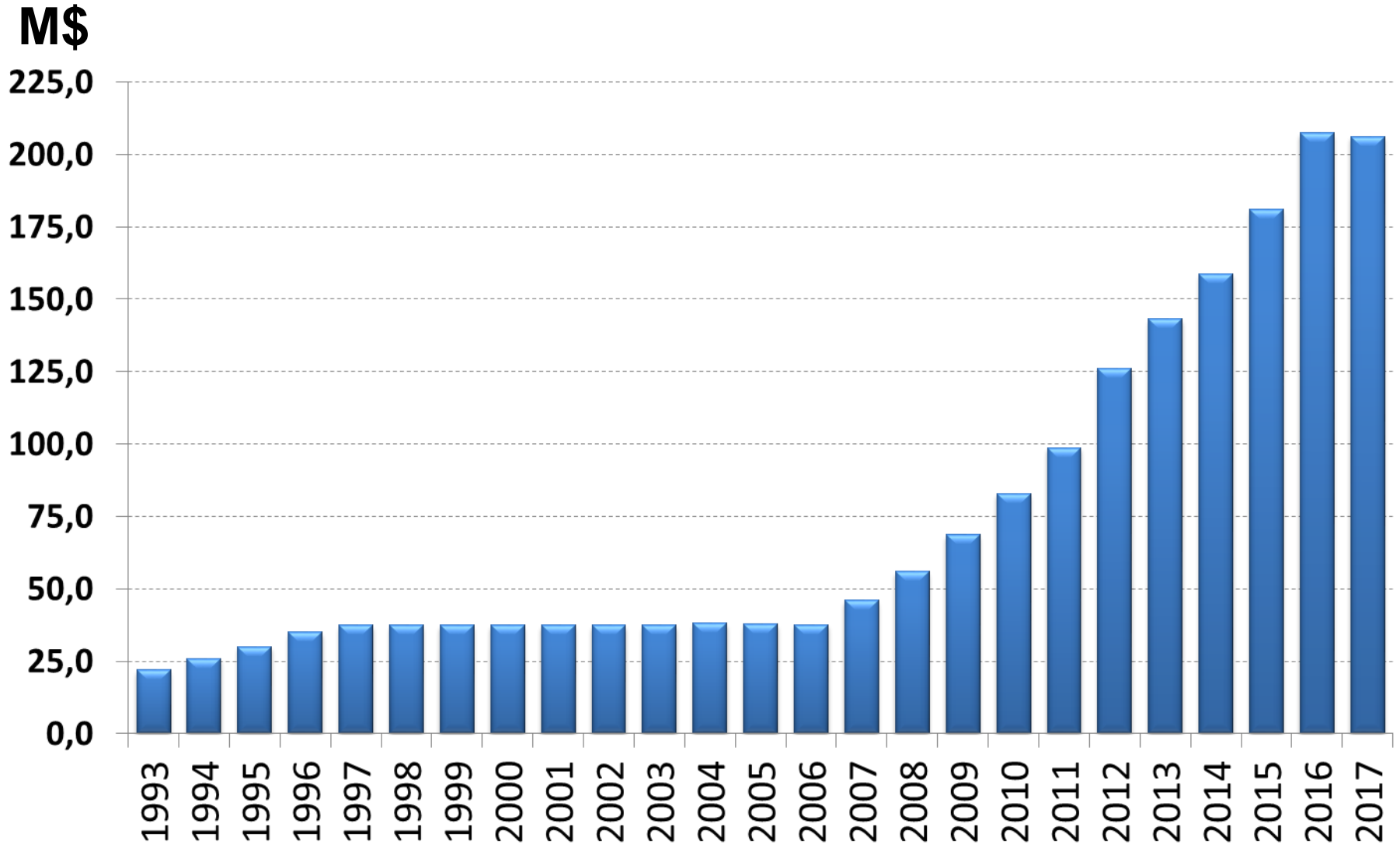


- **Membership of Belarus, Russia, and Ukraine was approved at CP session in December 1991;**
- **Armenia, Azerbaijan, Georgia, Kazakhstan, and Moldova – March 1992;**
- **Uzbekistan – June 1992;**
- **Czech and Slovak Republics – March 1993;**
- **Associate members: Germany (July 1991) and Hungary (February 1993).**

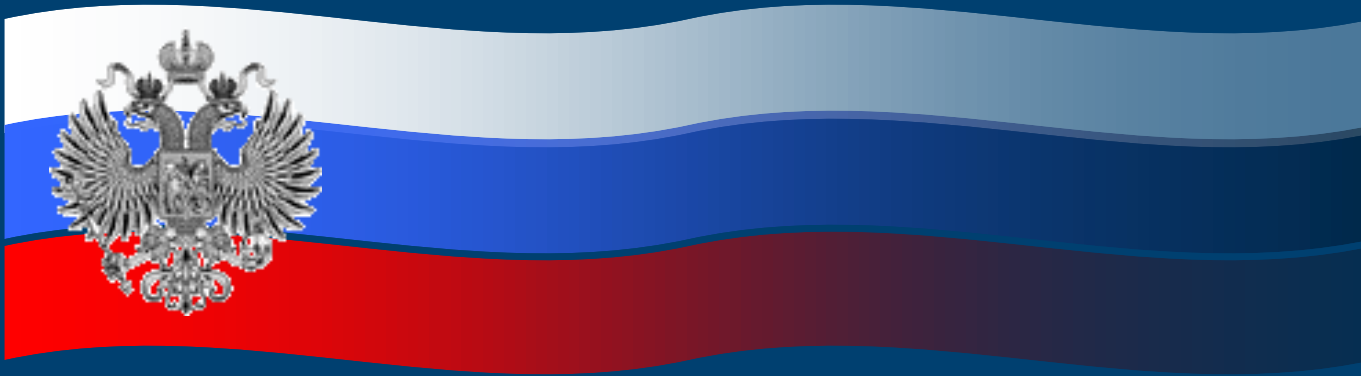
Early 1990-ies:

- ✓ **Dramatic transformation of European socio-political landscape;**
- ✓ **Economies in transition in Central/Eastern Europe, Russia: social and economic challenges;**
- ✓ **New era of cooperation for JINR: new Member States and Associate Members.**

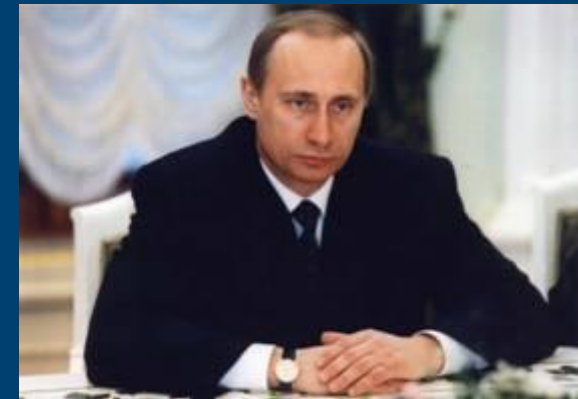
JINR Budget 1993–2017



JINR – Russia Agreement

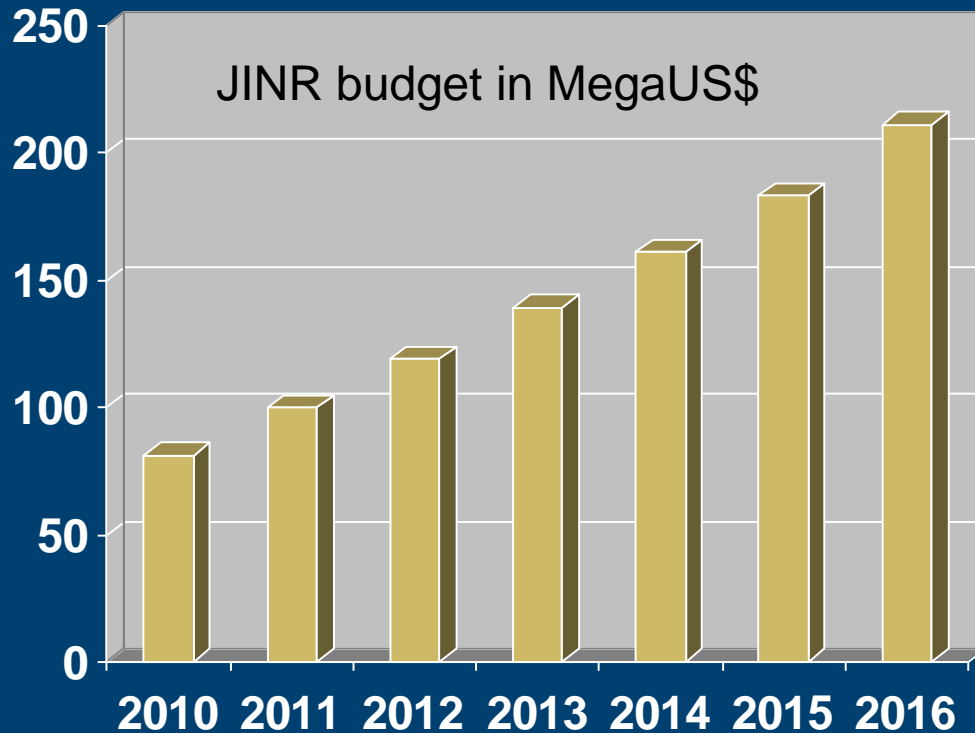



A very important for JINR Russian Federal law was signed by President V.Putin in 2000. This is ***“The Agreement between the Government of the Russian Federation and JINR on the Location and Terms of Activity of JINR in the Russian Federation”***. This Agreement grants privileges and immunities in accordance with established practice for international intergovernmental organizations.

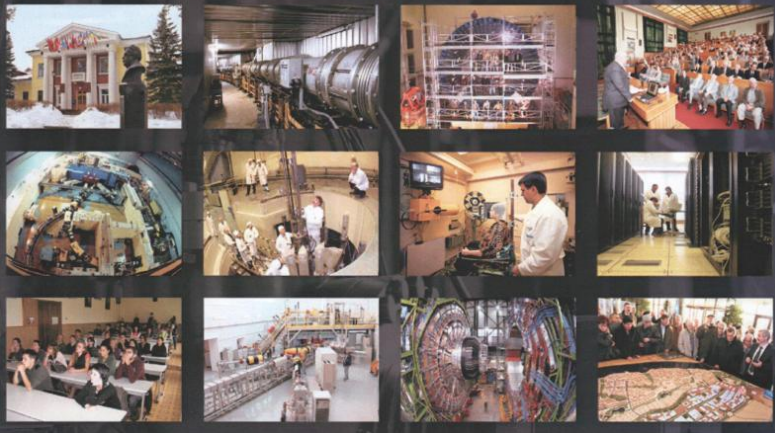


JINR in some figures

- ▣ JINR's staff members ~ 4500
- ▣ **researchers ~ 1200**
including from the Member States
(but Russia) ~ 400
- ▣ **Doctors and PhD ~ 1000**



 **JOINT INSTITUTE FOR NUCLEAR RESEARCH**



**SEVEN-YEAR PLAN
FOR THE DEVELOPMENT OF JINR
2010–2016**

(Approved by the Committee of Plenipotentiaries of the Governments of the JINR Member States at its session held on 19–21 November 2009)

Dubna 2009

JINR has at present 18 Member States



Armenia
Azerbaijan
Belarus
Bulgaria
Cuba
Czech Republic
Georgia
Kazakhstan
D. P. Republic of Korea
Moldova
Mongolia
Poland
Romania
Russian Federation
Slovakia
Ukraine
Uzbekistan
Vietnam

Participation of **Egypt**, **Germany**, **Hungary**, **Italy**, **Republic of South Africa**, **Serbia** in JINR activities is based on bilateral agreements signed on the governmental level.

Big 5 of JINR International Cooperation (2016)

Short-Term visits

to JINR

1. Belarus	105
2. Poland	92
3. Germany	86
4. France	66
5. Czech Republic	64
CERN	18
Total:	875

from JINR

1. Germany	262
2. Czech Republic	122
3. Poland	122
4. France	119
5. Belarus	116
CERN	442
Total:	1969

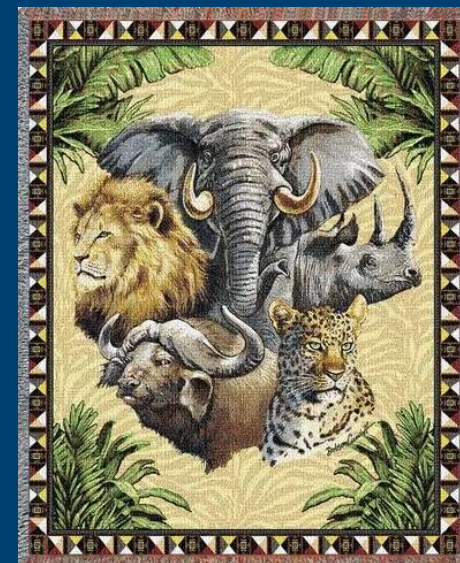
Collaboration with research centers and universities

Russia	170
1. USA	77
2. Germany	67
3. France	39
4. Italy	38
5. Romania	35

European Union (EU)	341
BRICS (without Russia)	50

JINR participants in conferences:

1. Germany	117
2. Poland	90
3. Bulgaria	86
4. Italy	62
5. USA	45
Total:	981



Contribution to JINR (2017)

Russia
1. Poland
2. Czech Republic
3. Ukraine
4. Slovak Republic
5. Romania

JINR manages in total cooperation with 800+ organizations in 60+ countries

Joint publications with JINR authors and authors from different countries (2017)

JINR Member States	Number of Publications
ARMENIA	261
AZERBAIJAN	118
BULGARIA	245
BYELARUS	265
CUBA	28
CZECH REPUBLIC	365
KAZAKHSTAN	18
MOLDOVA	14
MONGOLIA	28
POLAND	395
GEORGIA	210
ROMANIA	183
SLOVAKIA	198
UKRAINE	218
UZBEKISTAN	11
VIETNAM	9

JINR Associate Members	Number of Publications
EGYPT	141
GERMANY	513
HUNGARY	245
ITALY	395
SERBIA	220
SOUTH AFRICA	144

Other States	Number of Publications
USA	443
FRANCE	369
PEOPLES R CHINA	333
SWITZERLAND	319
ENGLAND	298
SPAIN	292
TURKEY	278
BRAZIL	258
AUSTRIA	247
GREECE	247
TAIWAN	245
SOUTH KOREA	238
PORTUGAL	236
COLOMBIA	214
INDIA	204
MALAYSIA	204
JAPAN	191
SWEDEN	191
PAKISTAN	183
NETHERLANDS	169
MEXICO	167
CROATIA	156
FINLAND	153
THAILAND	147
BELGIUM	141
CANADA	133
CYPRUS	133
NORWAY	132
DENMARK	124

IRAN	123
IRELAND	121
ESTONIA	118
LITHUANIA	116
NEW ZEALAND	115
SRI LANKA	113
ECUADOR	112
SCOTLAND	112
CHILE	110
LATVIA	109
QATAR	109
ISRAEL	107
AUSTRALIA	106
ARGENTINA	101
SLOVENIA	94
MOROCCO	92
PALESTINE	81
PERU	29
INDONESIA	25
SAUDI ARABIA	11
TAJIKISTAN	6
JORDAN	4
MONTENEGRO	3
VENEZUELA	3
ALBANIA	2
ALGERIA	2
MACEDONIA	2
ICELAND	1
TUNISIA	1
WALES	1

Cooperation with CERN

CERN is JINR's main partner in Particle Physics over more than 50 years.
Dubna physicists are widely involved in more than
20 CERN projects, including 3 LHC experiments & LHC itself



1963, JINR, Dubna
CERN Director-General
Prof. V.Weisskopf,
Prof. V.Dzhelepov and
Prof. B.Pontecorvo



2004, JINR Dubna
CERN Director-General Dr R.Aymar
meeting with
JINR director acad. V. Kadyshovsky



1971, Dubna
CERN Director-General Prof. W.Jentschke
and JINR Director Prof. N.Bogoliubov

2010: CERN – JINR mutual participation in their projects

2014: CERN – JINR reciprocal Observer status



JINR vs CERN @ Web of Science®

JINR publication statistics		in comparison with CERN
2011 – 2017	2017	CERN 2017
Total number of publications: 8 178	Total number of publications: 1 260	Total number of publications: 1 287
Total number of citations: 97 711	Total number of citations: 1 202	Total number of citations: 1 694
Excluding self-citations: 77 861	Excluding self-citations: 837	Excluding self-citations: 1 226
Average citations per article: 11,95	Average citations per article: 0,95	Average citations per article: 1,32
h-index: 106	h-index: 14	h-index: 15

2016: JINR in comparison with CERN	
JINR	CERN
Total number of publications: 1147	Total number of publications: 1186
Total number of citations: 1164	Total number of citations: 2241
Excluding self-citations: 948	Excluding self-citations: 1829
Average citations per article: 1.01	Average citations per article: 1.89
h-index: 14	h-index: 17

JINR comprises 7 Laboratories, each being comparable with a large institute in the scale and scope of investigations performed



**Dzhelepov
Laboratory of Nuclear Problems**



**Veksler and Baldin
Laboratory of High Energy Physics**



**Bogoliubov
Laboratory of Theoretical Physics**



**Flerov
Laboratory of Nuclear Reactions**



Frank Laboratory of Neutron Physics



Laboratory of Radiation Biology



**Laboratory of
Information Technologies**

FLNR accelerator complex





May 2012:

Official approval of the name *Flerovium* for element 114
and the name *Livermorium* for element 116

30th December 2015:

Approval of the discovery of new elements 113, 115, 117, and 118

I U P A C
International Union of Pure
and Applied Chemistry

- element 113: RIKEN (Japan)
- elements 115 and 117: JINR (Dubna) - LLNL (USA) – ORNL (USA) collaboration
- element 118: JINR (Dubna) – LLNL collaboration.

28th November 2016:

IUPAC formally approved names and symbols of new elements:

Nihonium (Nh) for element 113,
Moscovium (Mc) for element 115,
Tennesse (Ts) for element 117, and
Oganesson (Og) for element 118.

Флеровий 114

Fl

Flerovium

Московский 115

Mc

Moscovium

Ливерморий 116

Lv

Livermorium

Теннессин 117

Ts

Tennesse

Оганесон 118

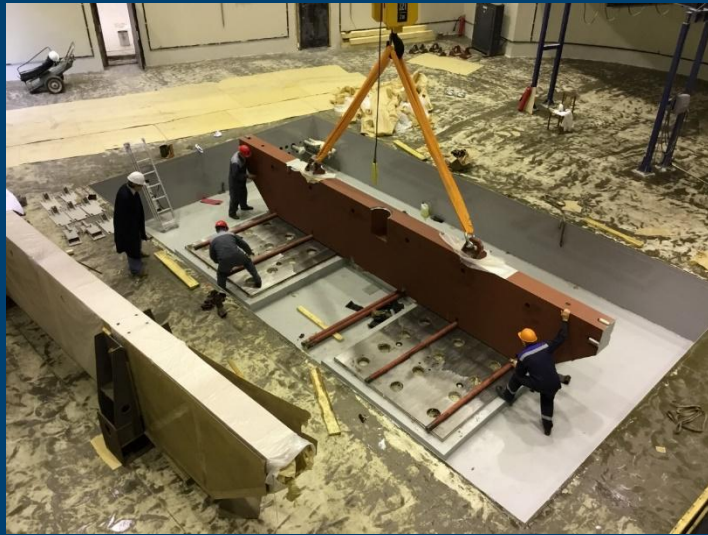
Og

Oganesson

**All these elements were synthesized for the first time at the U-400
accelerator complex of the Flerov Laboratory of Nuclear Reactions of JINR.**

DC-280 cyclotron: main magnet assembling

15 September 2016: started



18 October 2016

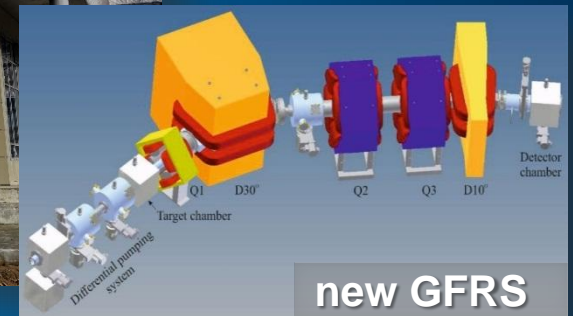


18 January 2017



Magnet of DC280 cyclotron is assembled and ready for testing!

Today: constructing the SuperHeavy Elements (SHE) Factory



- ❑ Completion of the SHE Factory building and its engineering systems (*April 2018*)
- ❑ Assembling the DC-280 cyclotron. Installation of new Gas-Filled Recoil Separator (*April – July 2018*)
- ❑ First experiments (*2018*)

Technology transfer to JINR Member States

CYCLOTRON CENTRE IN ASTANA (KAZAKHSTAN) LAUNCHED IN 2006



- **2003:** Government decision on the creation of a cyclotron center in Astana
- **2004–2005:** Designing and manufacturing of equipment of the DC-60 cyclotron
- **2006:** Delivery of equipment to Astana; mounting, tuning and adjustment; first beam generation



**DC-60
CYCLOTRON**

IBR-2: Pulsed reactor with fast neutrons

mean power **2 MW**

pulse frequency **5 Hz**

pulse width for fast neutrons **200 μ s**

thermal neutrons flux density on the moderator surface: **10^{13} n/cm²/s**

maximum in pulse: **10^{16} n/cm²/s**

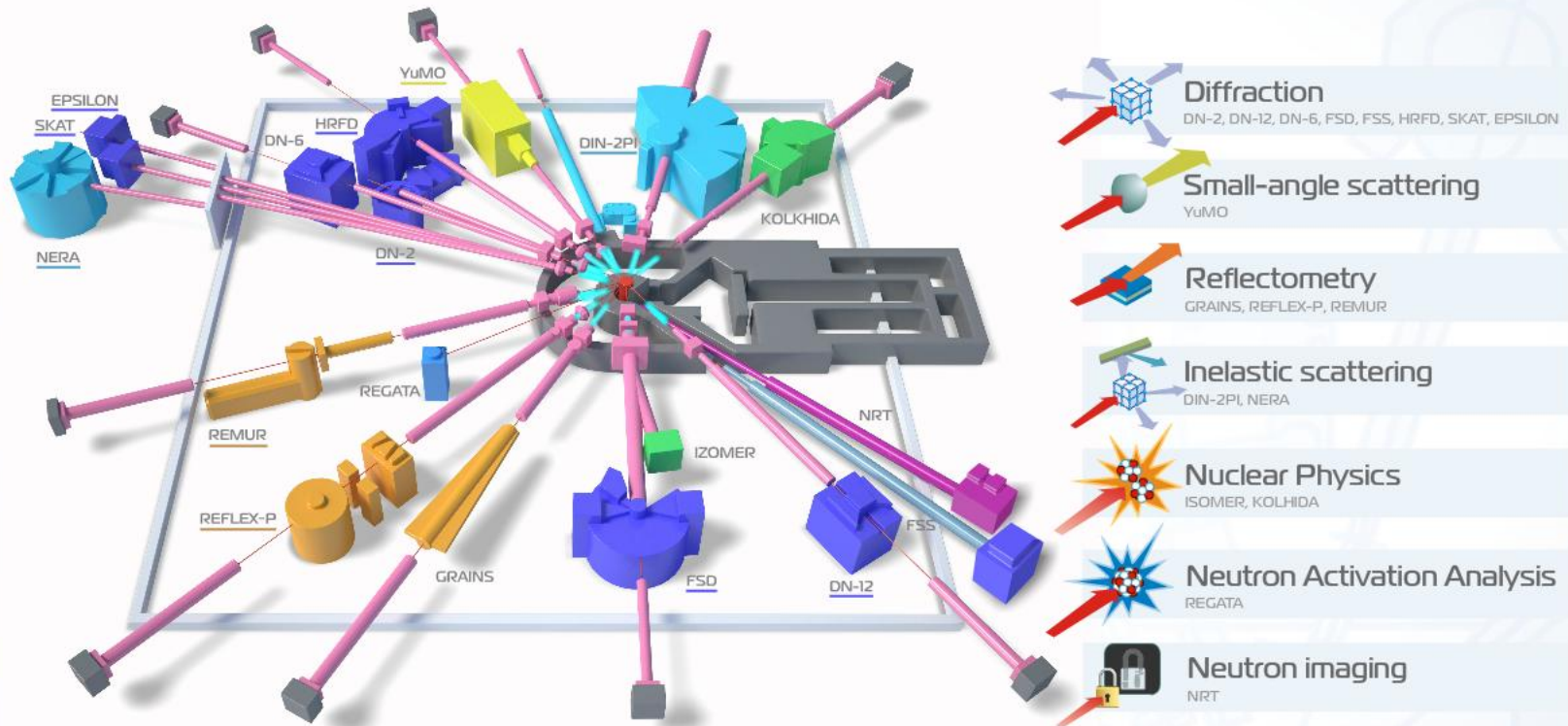


IBR-2 is included in the 20-year European strategic research program in the field of neutron scattering



Facilities at IBR-2 reactor

15 instruments are in operation at the Spectrometer Complex of the IBR-2M Reactor



The user policy of the IBR-2 is world friendly.
~200 proposals from ~20 countries are selected annually

Assembling of the First Cluster of the GVD at the Baikal lake, Start at March 2015

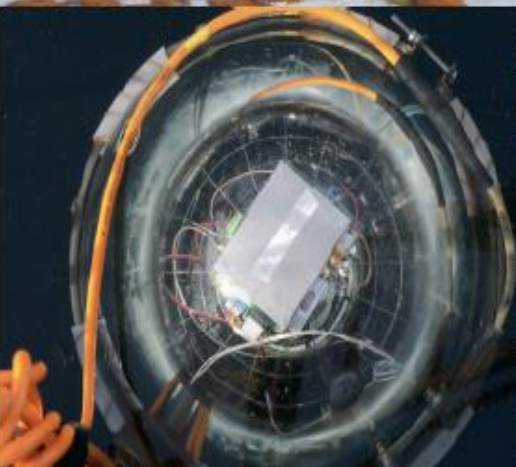


Бруно Понтекорво

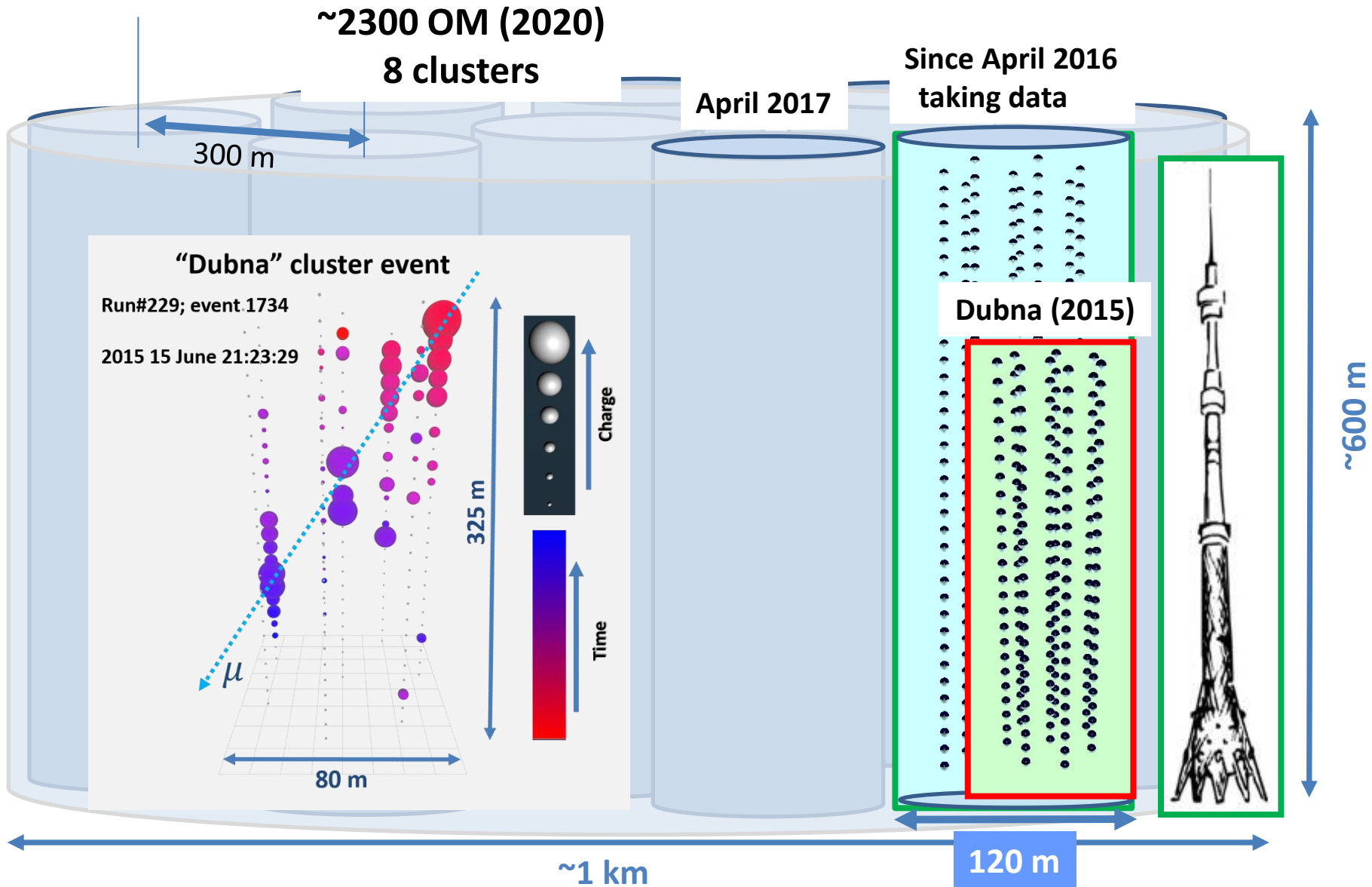
JINR
Dzheleпов
Laboratory
for Nuclear
Problems
INR of RAS
Institute for
Nuclear
Research of
the Russian
Academy of
Sciences



M.A. Markov



Present and future of the BAIKAL-GVD



Merging of the Laboratory of High Energy and Laboratory of Particle Physics into the **Veksler and Baldin Laboratory of High Energy Physics**



Veksler & Baldin Laboratory of High Energy Physics

*is founded on **May 4-th 2008** in accordance with the decisions of the JINR Committee of Plenipotentiaries (27-28 Nov. 2007) by the JINR Director decree N 112 of February 19th, 2008*

27 – 28 ноября 2007 г.

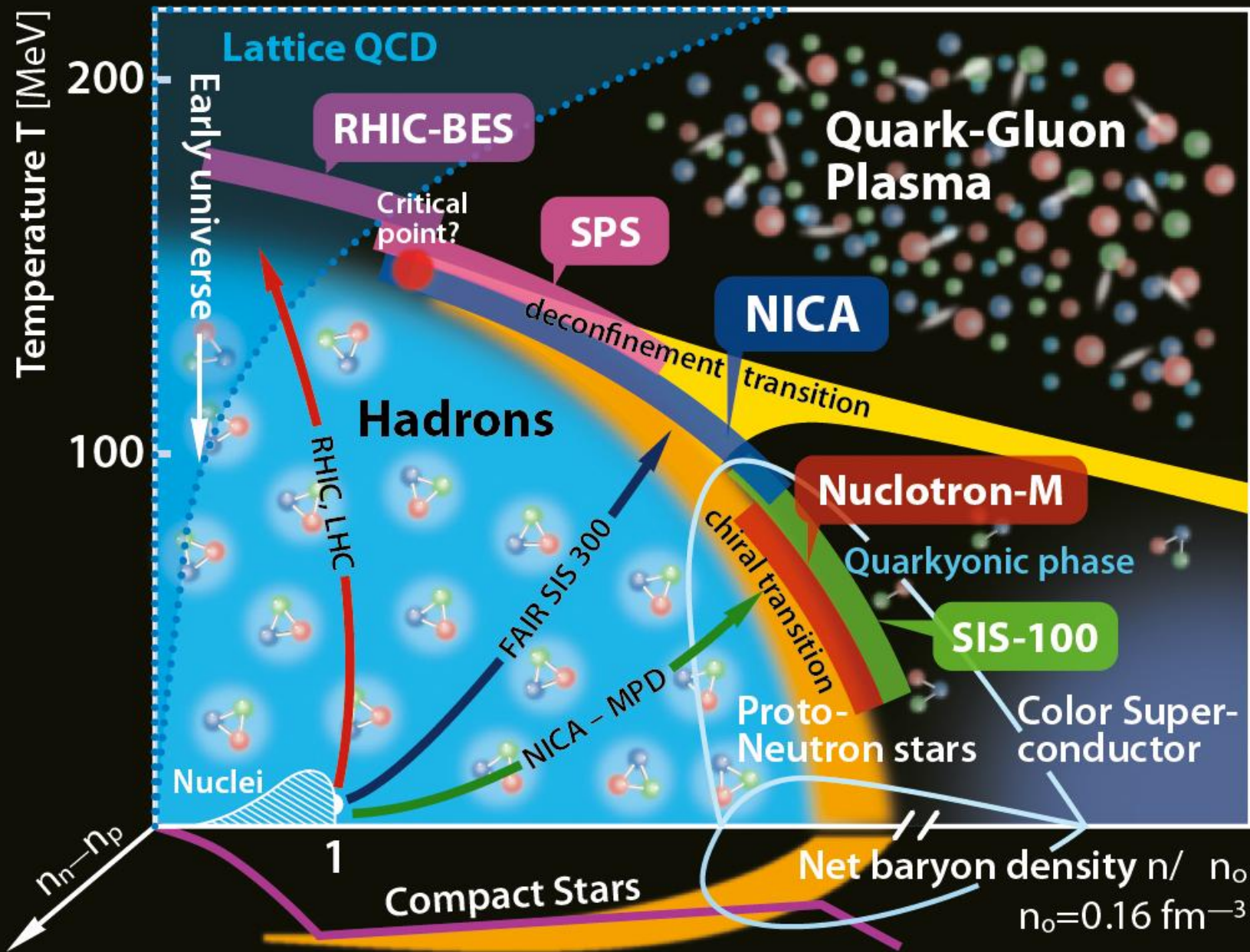
«Комитет полномочных представителей ПОСТАНОВЛЯЕТ:

... Одобрить предложение дирекции Института об изменении структуры ОИЯИ в связи с планами модернизации ускорительного комплекса нуклотрона и создания установки NICA. С целью концентрации кадровых и финансовых ресурсов на выполнении этой приоритетной программы ОИЯИ создать Лабораторию физики высоких энергий им. В.И. Векслера и А.М. Балдина, исключив из структуры Института Лабораторию высоких энергий им. В.И. Векслера и А.М. Балдина и Лабораторию физики частиц».

NICA Layout



**25 March 2016. NICA “corner stone”
ceremony at LHEP JINR**



Infrastructure (SC magnets)

~ 450 SC magnets will be assembled & tested in the workshop for NICA & SIS-100 FAIR



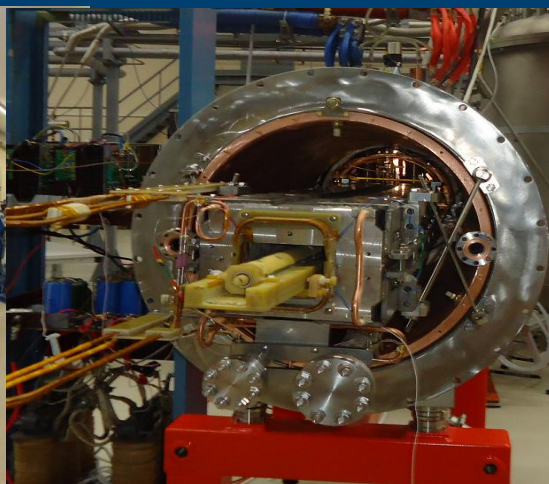
workshop ifor coil production



The technological line for SC magnet assembly and tests



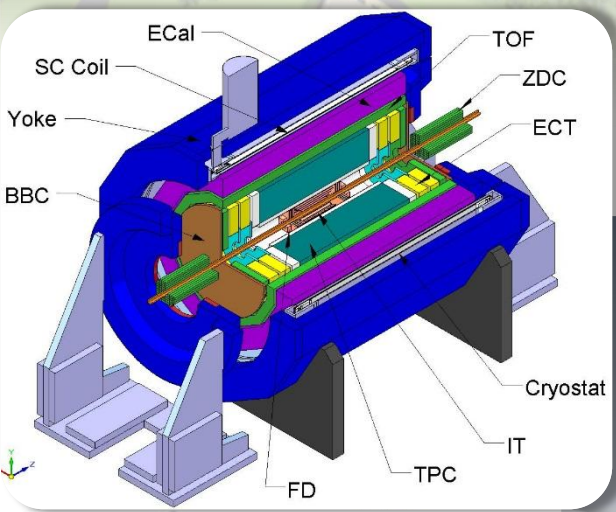
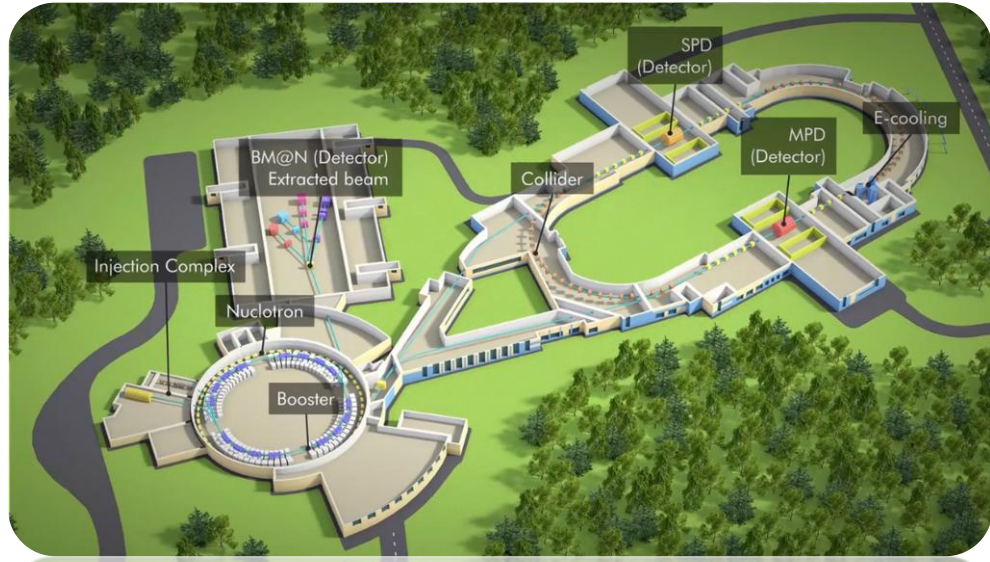
SC cable production workshop



Tests of the pre-serial dipole magnet: magnetic field measurements

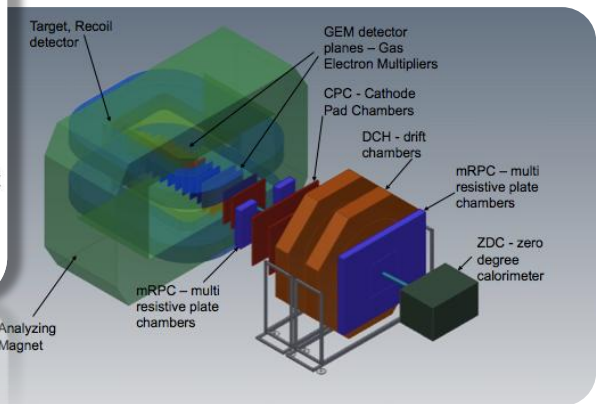
Status of the NICA complex realization

Nuclotron & channels	40%
Injection complex	49%
Booster	64%
Collider	18%
MPD	35%
BM@N	60%
SPD	2%
Infrastructure	39%
Innovation area	1%
IT & computing	25%



MPD

BM@N



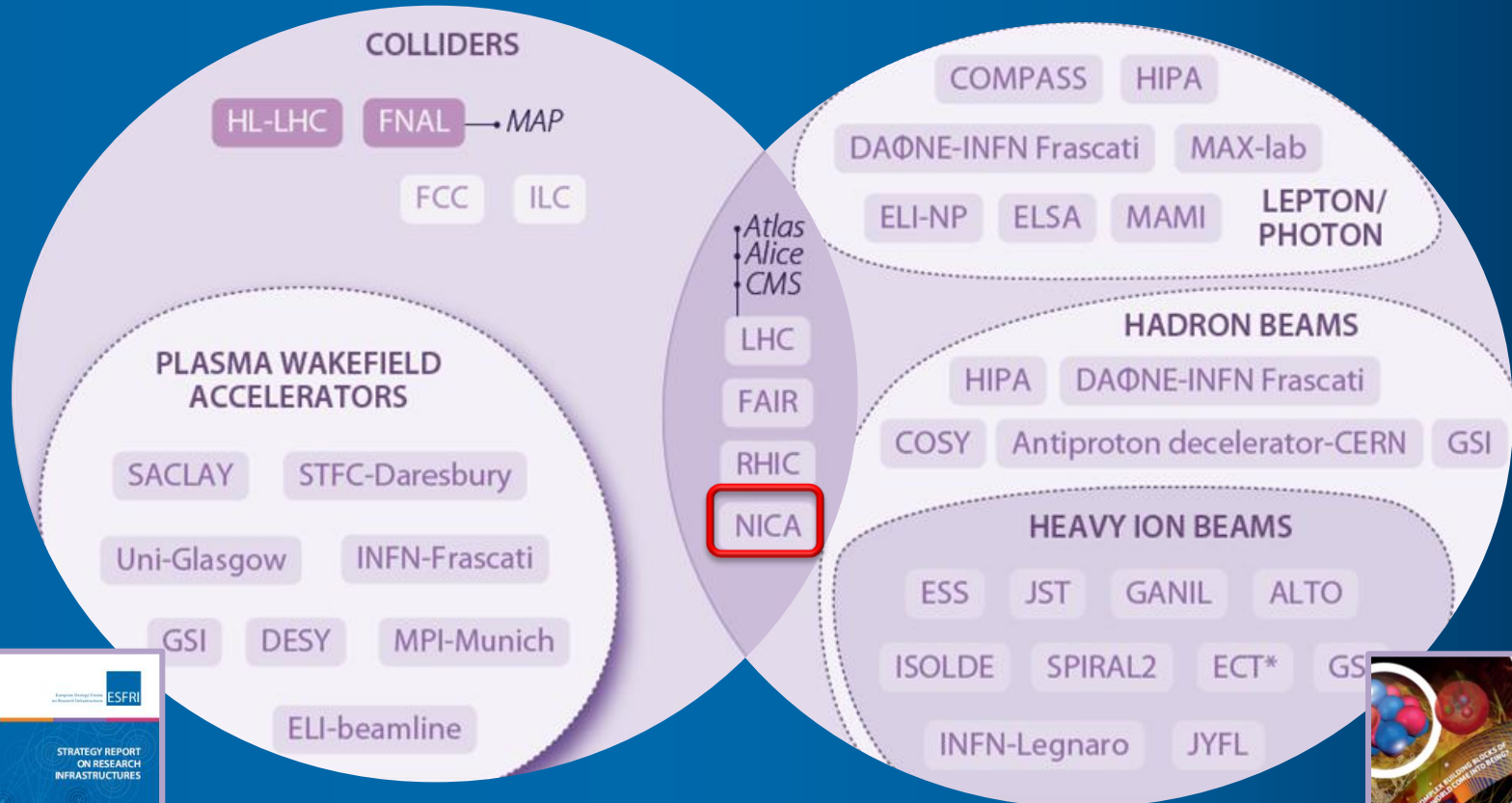
NICA Center

New issue of the ESFRI Roadmap

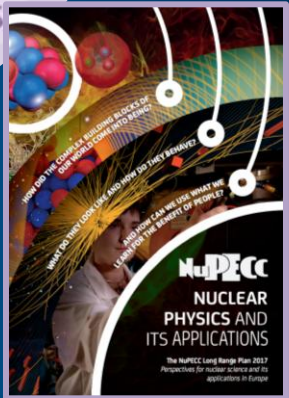
Main Research Infrastructure in Particle and Nuclear Physics

PARTICLE PHYSICS

NUCLEAR PHYSICS



NICA – Complementary Project



Participants of HLC
JINR: 25 year of New Era
25/03/2018



NICA construction site a year ago

27/05/2017

Most recent view of NICA construction site



14/06/2018





Reorganization of the Laboratory of Computing 2000: Techniques and Automation (LCTA) into the Laboratory of Information Technologies (LIT)



Challenges before 2000:

- ❑ Transition of the developed countries worldwide to the unified information society
- ❑ Transition to distributed computing that ensures participation in the large-scale international research projects (LHC)
- ❑ The need to connect to computer networks for science and higher education
- ❑ Application of international standards
- ❑ Transition to electronic methods of particle detection

Laboratory today:

MICC main components



GRID



HPC



Cloud



Networking



Power@cooling

LAN

• 10 Gbps

WAN

• 100 Gbps +
2x10 Gbps

Tier-1

• 4160 core,
• 5,4 PB disk, 9 PB
tape

CICC-
Tier-2

• 3640 core,
2PB disk

HPC-
HybriLIT

• 252 CPU, 77184 GPU
cores, 182 PHI-cores, 2.4
TB RAM, 57.6 TB HDD,
142 Tflops

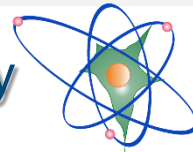
Cloud

• 700 CPU, 2 TB
RAM

Now, LIT IT-infrastructure is one of the JINR basic facilities

Establishment of a new, seventh laboratory of JINR

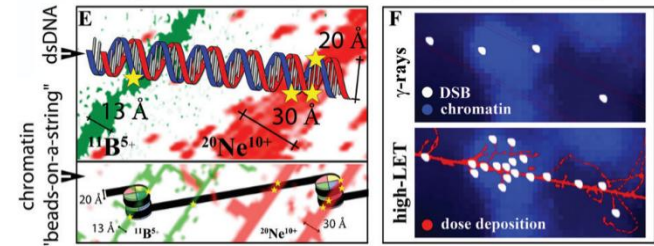
2005: Laboratory of Radiation Biology



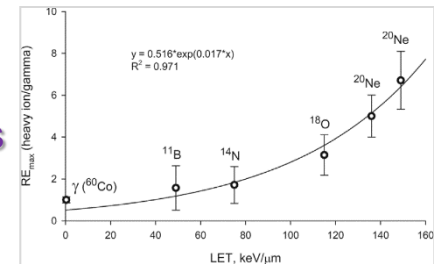
Laboratory today:



Molecular radiobiology

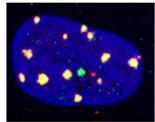


Radiation mutagenesis

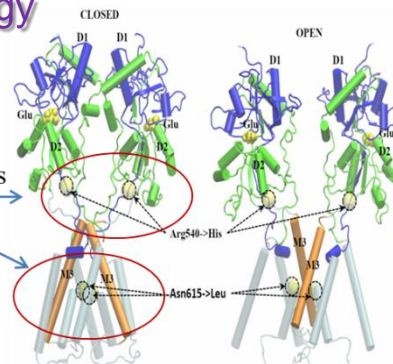


Radiation physiology

DNA damage



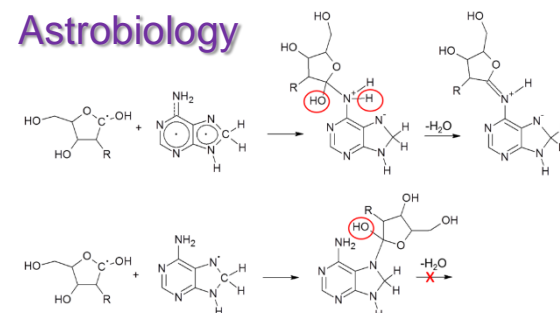
mutations



Nuclear planetary science

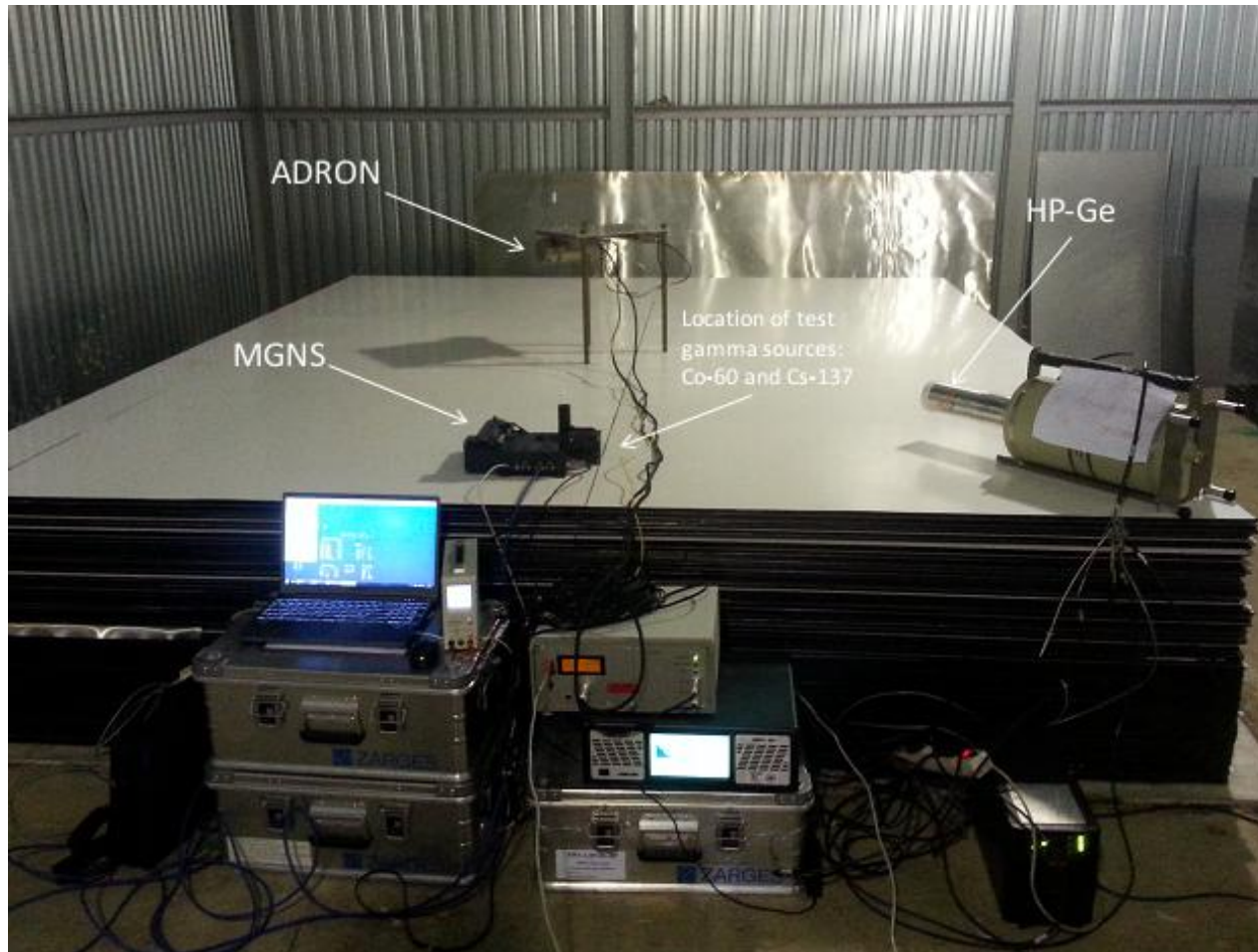


Astrobiology





Nuclear planetary science



In collaboration between the Space Research Institute (RAS) and FLNP (JINR), a *special facility has been constructed at the LRB that can model planetary soil and allows testing prototypes of active neutron and gamma spectrometers.*

The facility can use a neutron generator for soil model exposure. Inside the facility, a silicate glass-based soil model has been assembled.



SAINT PETERSBURG
STATE UNIVERSITY

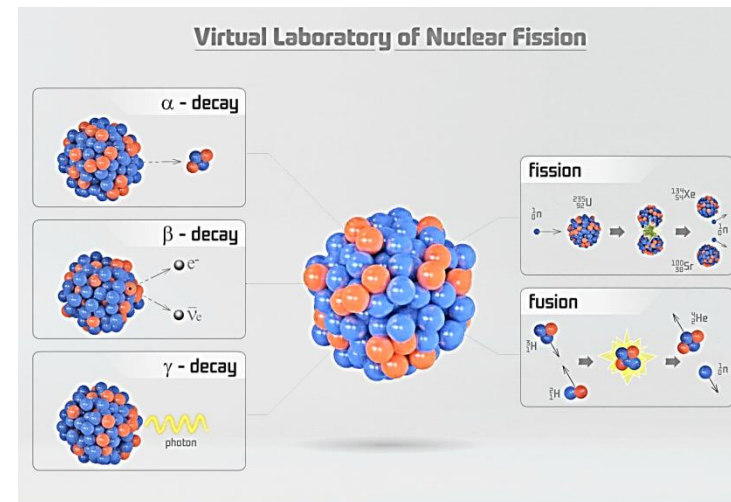


Казанский
федеральный
УНИВЕРСИТЕТ



- Attachment of students (**about 2500 students and PhDs annually**)
- International Student Practice (**1267 participants since 2004**)
- Summer Student Programs (**205 participants since 2014 (62 in 2018)**)
- Engineering and Physics Training

- International Scientific Schools for physics teachers at JINR and CERN (**720 participants from 8 countries since 2009**)
- Festivals of Science (**Since 2014**)
- Interschool Physics and Mathematics Open Classroom
- Popular lectures, videoconferences and visits to JINR
- Department of Development of Modern Education Programmes



Bringing people together

The Institute annually organizes up to 10 large conferences and more than 30 international workshops, as well as schools for young scientists, practice courses and schools for teachers – in total more than 100 international events per year, including 10 regular sessions of the JINR governing bodies.

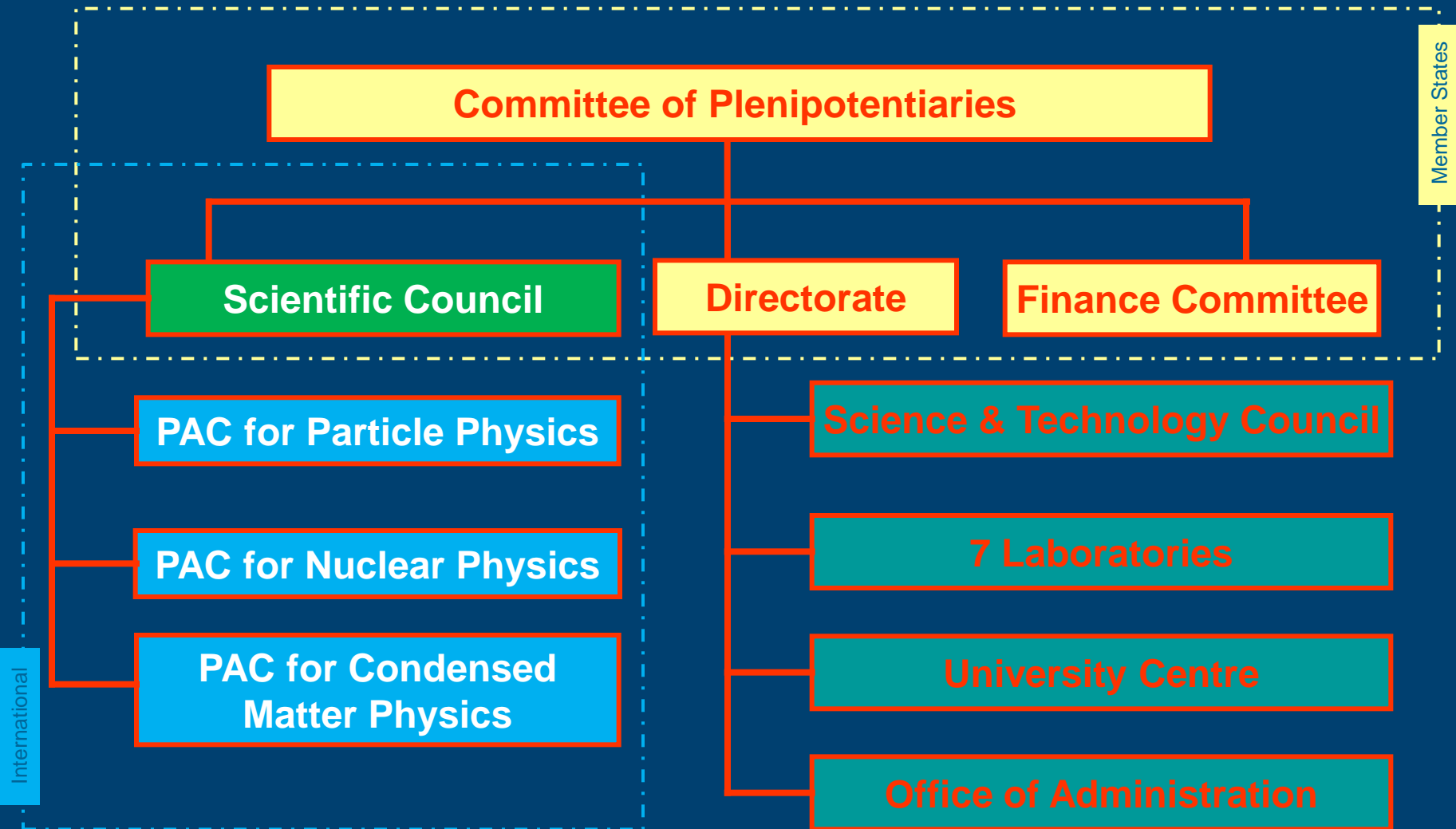


Geography of JINR meetings in 2016

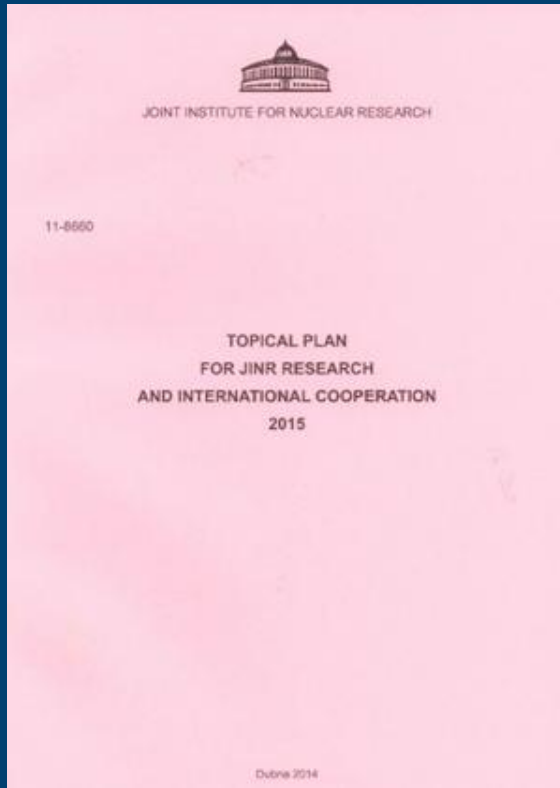


Science
Bringing
Nations
Together

JINR Governing bodies and structure



The scientific activity of JINR is executed on the basis of the annually issued document “Topical Plan (TP) for JINR Research and International Cooperation.”



TP includes projects selected by the **Scientific Council** and approved by **JINR Directorate** as individual topics.



Joint Institute for Nuclear
Research

SCIENCE BRINGING NATIONS
TOGETHER

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Nuclear Newcomers' visits at the governmental level in 2016-2017

 **03/2016 Ethiopia**
 **06/2016 Botswana**
 **Paraguay**
01/2017 Bolivia
Lanka

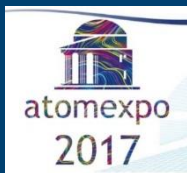
 **02/2017 Zambia**
 **04/2017**
 **09/2017 Shri Lanka**

The visits were aimed at studying the opportunities for the use the JINR experience in establishing national expertise in nuclear sciences and applications, participation in JINR education programmes and providing access to modern scientific infrastructure for young talented researches.



Round table in framework of «ATOMEXPO-2017» in JINR / June 2017

90+ experts from 20 countries discussed the key issues related to JINR experience with efficient operation of Research Infrastructure and User Policy



International Atomic Energy Agency

On 18 May, 2013 **Director General Yukiya Amano** visited JINR.



IAEA

International Atomic Energy Agency



Yukiya Amano: «*I was impressed by the level of JINR research activities*»

JINR regularly takes part in IAEA General Conference



During the 59th Session of IAEA General Conference in September 2015, Vienne / Austria.

**JINR has established close partnership with
United Nations Educational, Scientific and Cultural Organization.**

The bilateral agreement on cooperation was signed up on 1 April, 1997 in Paris to promote international co-operation for research on the fundamental properties of matter.



Vladimir Kadyshevsky (JINR), Federico Mayor (UNESCO) Paris, 1997

The up-dated Agreement on cooperation between JINR and UNESCO has been signed in 2016. It includes the following **amendments** on the part of JINR:

- ❑ to annually host up to 10 (ten) research assistants commissioned by UNESCO
- ❑ to offer 4 (four) one-year grants for researchers commissioned by UNESCO to work at JINR
- ❑ to provide UNESCO with JINR conference facilities to hold international forums

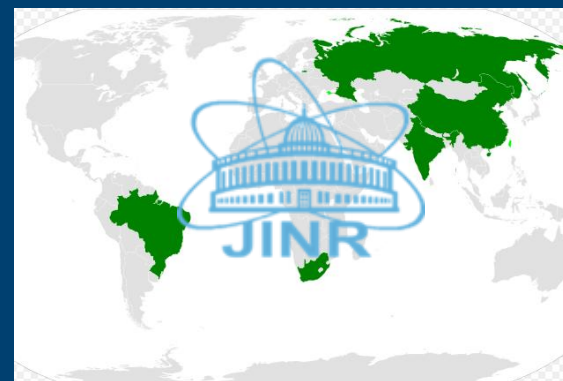
Under the aegis of UNESCO the **RAS** together with **JINR** held four international conferences in **Dubna (Russia, 2000)**, in **Yerevan (Armenia, 2005)**, in **Alushta (Crimea, 2010)** and in **Saint-Petersburg (Russia, 2015)**

- Now the book "Mutation, Evolution and Radiation: the Legacy and Impact of Nikolai V. Timofeev-Ressovsky on Current Research" is ready to be published under Patronage of UNESCO and JINR logo.

Cooperation with BRICS



The 1st Meeting of BRICS Working Group on Research Infrastructure and Mega-Science projects
15-16 May 2017, JINR, Dubna



Multidisciplinary Fora
«Frontiers in Nuclear,
Elementary Particle
and Condensed Matter Physics»
16-20 June 2014. India-JINR
15-19 June 2015. Brazil-JINR

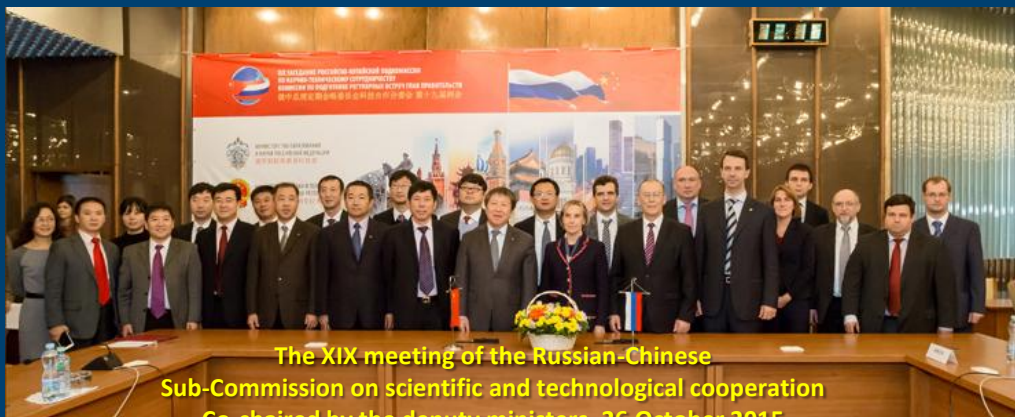
Draft Cooperation Agreements submitted
to DAE/India and to CNEN/Brazil in 2016



Ambassador of Brazil, Forum closing, 2015

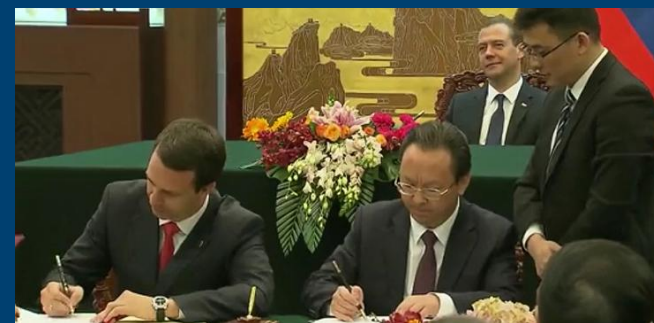


Joint Secretary,
Department of Science & Technology of India
Forum follow-up visit. September 2014



The XIX meeting of the Russian-Chinese
Sub-Commission on scientific and technological cooperation
Co-chaired by the deputy ministers. 26 October 2015

20th Regular Meeting of Prime Ministers of Russia and China



Signing Quadripartite Protocol between
MES/Russia, MOST/China, CAS/China and JINR, 17 December 2015

Meeting of the Group of Senior Officials on Global Research Infrastructures

9-12 October 2017 JINR Dubna, for the first time in Russian Federation



The GSO proactively works to identify opportunities for international collaboration among Research Infrastructures that are proposed by its members: it has identified five Case Studies and has carried out an analysis on their potential as Research Infrastructures for global collaboration.

Feedback from the G7 Meeting of Science Ministers (G.Rossi),
International Cooperation in the Field of Research Infrastructure of RF (G.Trubnikov)
Reports on policy areas: "Open Data management", "Open Innovation",
Excellence-driven access".



Acquaintance
to major JINR infrastructures



Presentations
of mega-projects of Russian Federation

How to
learn
more?

Programme for scientific and international administration “JINR Expertise for Member States and Partner Countries” (JEMS)

Held in 2017

- I April, 17-21
- II June, 19-23
- III September, 4-8
- IV November, 27 – December, 1
- V December, 4-8 (in Russian)

Plan for 2018

- VI April, 16-20
- VII June, 4-8
- VIII September, 3-7 ←
- IX December, 3-6

<http://www.jinr.ru/JEMS>



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JEMS V: Belarus, Moldova, Russia



JEMS IV: China, Hungary, Mongolia, Serbia



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Nations
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Welcome to www.jinr.ru